



ELECTRICAL AND ELECTRONICS



**INNOVATING HIGH-VALUE
MANUFACTURING**



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Minister of International Trade and Industry

The electrical and electronics (E&E) sector remains key to Malaysia's continued industrial growth, providing for new businesses and new jobs. The GNI contribution from the E&E sector has increased from RM38.7 billion in 2009 to RM63.4 billion in 2017. In fact, Malaysia is the world's 7th largest exporter of E&E products valued at RM343.0 billion, accounting for 36.7% of total exports for the year. Moreover, the industry has shown an upward trend in exports for the past four years. It is also the only industry with a trade surplus for four consecutive years from 2014 to 2017. Presently, Singapore, China and the United States are Malaysia's major export destinations for E&E products.

In preparation for the global digital revolution, a High-Level Task Force (HLTF) chaired by the Ministry of International Trade and Industry (MITI) has been formed to spearhead the development of the National Industry 4.0 Blueprint, with strong consideration on feedbacks from both public and private sectors. As such, this blueprint has recognised E&E as a priority area.

In the first 10 months of 2017, the Malaysian Investment Development Authority (MIDA) approved a total of 91 E&E projects with investments of up to RM9 billion. Of these, 17 projects are new with investments totalling RM1.2 billion, while 74 were expansion and diversification projects with investments amounting to RM7.8 billion. Foreign investments contributed 86%, or RM7.8 billion while domestic investments accounted for 13% or RM1.2 billion.

Most of the E&E investments involved expansion and diversification activities in the manufacturing of light-emitting diode (LED) products, household appliances, solar wafers, cells and modules, thus realising Malaysia's vision of moving towards more value-added upstream activities. The industry is expected to generate new job opportunities for 9,238 people.

Of note, the Collaborative Research Engineering for Science and Technology (CREST) has provided a conducive platform for the industries, academia and government to work together to nurture innovation and research activities. In 2017, 11 new projects were approved with a commitment from CREST, industries and universities amounting to RM16.1 million. These projects are expected to further produce high quality inventions for commercialisation. On top of that, 11 projects were successfully completed with one intellectual property (IP) filed and one open-source licence created. Since its inception in 2012, CREST has successfully produced 57 postgraduates with projected cumulative income of RM16.2 million from 2017 until 2022.

MITI is currently working closely with MIDA to establish a Manufacturing Innovation Centre (MIC) for the E&E sector to tackle issues related to talent, foreign workers, technology adoption, low R&D spending and the lack of a cohesive ecosystem. These efforts reflect MITI's commitment to push the industry towards Industry 4.0 to ensure Malaysia remains competitive in the global arena.



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The NTP continues to place emphasis on the role of the electrical and electronics (E&E) sector for its contribution to the socio-economic development of the nation. In this respect, the Ministry of Science, Technology and Innovation (MOSTI) together with its agencies; MIMOS Berhad, SIRIM Berhad and NanoMalaysia Berhad continue to play an active role in re-energising this sector to catalyse investment and provide high-skilled employment opportunities.

As at 2017, MIMOS has successfully established an E&E shared services platform for advanced analytical services in the semiconductor industry. The platform is currently utilised by over 300 companies. The facilities provided have proven invaluable in supporting business and industry needs, as evidenced by the increase in E&E exports from RM249.8 billion in 2010 to RM343.0 billion in 2017. Additionally, the facilities foster the birth of a knowledge-based economy by enabling local researchers and scientists to produce higher-quality inventions; thereby enabling them to compete in the global arena. Malaysia will move forward with increased collaborations with international partners and accreditation of the facilities which fulfil the required standards for global market acceptance.

NanoMalaysia Berhad, in spearheading the uptake of nanotechnology by E&E sector players, facilitated the development of two innovative products in 2017, namely; backup-storage graphene-based quantum cells (BSGQC) and light-emitting diodes (LEDs) using copper-based carbon nanotube (Cu-CNT) substrates.

The successful commercialisation of these products within the targeted NKEA timeframe will further strengthen our national capabilities in energy storage for a future solar-powered economy. To improve BSGQC uptake, close collaborations with solar-power companies and telco operators for full-fledged field trials of BSGQC will be explored. This technology will revolutionise the energy sector within the E&E ecosystem by creating supportive technology platforms to meet future energy needs while controlling the sector's impact to climate change.

In providing industry players, particularly small and medium enterprises (SMEs), with a facilitative environment to empower them to move up the manufacturing design value chain, SIRIM's Eco-Industrial Design Centre (EIDC) continues to offer much-needed assistance. Indeed, EIDC supports local firms in the production of environmentally friendly products through eco-innovation, whilst enhancing their capabilities for global competitiveness.

In addressing industry players' emerging challenges, especially in terms of labour, automation will be a key technology to be embraced. SIRIM will adopt Industry 4.0 by strengthening local industry players' uptake of additive manufacturing technology to increase the sectors' production capacity through proposing the establishment of an Additive Manufacturing Demonstration Centre (AMDC).



SURGING AHEAD WITH SEMICONDUCTORS

Malaysia has an extensive history in semiconductor industry, although activities were traditionally focused on the lower value-add spectrum such as testing and assembly. Under the NTP, the sector has shifted towards mature technology semiconductor fabrication and expanded into advanced packaging and integrated circuit (IC) design, among other higher value-add activities.

Semiconductor Value Chain	IC R&D and Design	Manufacturing and Fabrication	Advanced Packaging, Assembly and Testing	Sales and Distribution
Company	<ul style="list-style-type: none"> • Fabless company • IC design house 	<ul style="list-style-type: none"> • Foundry 	<ul style="list-style-type: none"> • Advanced packaging company • Outsourced assembly and test (OSAT) company 	<ul style="list-style-type: none"> • Original equipment manufacturer (OEM) • Original design manufacturer (ODM)
Supporting Industry	<ul style="list-style-type: none"> • Electronic design automation (EDA) company • Intellectual property (IP) company 	<ul style="list-style-type: none"> • Specialised equipment and tools supplier • Raw wafer and chemicals material supplier 	<ul style="list-style-type: none"> • Automated test equipment (ATE) manufacturer • Lead frames and packaging material supplier 	<ul style="list-style-type: none"> • Electronic manufacturing service (EMS) provider • Equipment and tool supplier

Semiconductor and integrated circuit (IC) industry value chain.

Invigourating semiconductor wafer fabrication

To fortify the electrical and electronics (E&E) ecosystem in Malaysia, specifically in the semiconductor industry, the Semiconductor Fabrication Association of Malaysia (SFAM) was established in 2012 to be an industry association for companies producing semiconductor wafers in Malaysia. It will act as the reference body for existing and future wafer fabrication partners in Malaysia, presenting a common voice to address local and global stakeholders. Officially inaugurated on 25 April 2017 at SEMICON Southeast Asia, SFAM is helmed by its President, Dato’ Peter Halm, with members from X-FAB, Silterra, ON Semiconductor, OSRAM Opto Semiconductor, MIMOS Semiconductor, Infineon Technologies and Fuji Electric. Its associate members are the Advanced Technology Training Centre (ADTEC) Kulim and the Advanced Multidisciplinary MEMS-Based Integrated Electronic NCER Centre of Excellence (AMBIENCE), Universiti Malaysia Perlis (UniMAP).

SFAM holds consultations with the public sector regarding infrastructure, water supply quality and electricity supply security, and promotes benchmarking based on global standards for industrial emission and discharge limits. It also facilitates the semiconductor industry development by expanding the local supplier base to support wafer fabs. Currently, it participates in the E&E Productivity Nexus to promote automation and Industry 4.0.

On the human capital development front, SFAM engages with academia such as UniMAP, Universiti Sains Malaysia (USM) and Universiti Kuala Lumpur (UniKL) among others to enhance the curriculum in engineering, science and technology. It also provides internship programmes for undergraduates and research opportunities for postgraduates and lecturers. For example, Silterra, a member of SFAM, has hosted 180 interns over 2016 and 2017. SFAM and MIMOS also co-developed a semiconductor training curriculum for the wafer fabrication industry.

To support critical high-technology expertise needs of wafer fabs, it works with relevant agencies such as Malaysian Investment Development Authority (MIDA) and Talent Corporation Malaysia Berhad (TalentCorp) to expedite immigration procedures. For experienced technicians, it collaborates with polytechnics and training centres to provide channels for employment through upskilling. Among these institutions are the Polytechnic Tuanku Sultanah Bahiyah (PTSB) Kulim, Polytechnic Sultan Abdul Halim Mu'adzam Shah (POLIMAS) Jitra, ADTEC Kulim, ADTEC Taiping, and the Kedah Industrial Skills and Management Development Centre (KISMEC).

Supporting wafer fabrication via advanced analytical services lab

The MIMOS Advanced Analytical Services Lab supports the wafer fabrication industry by meeting the analytical services needs. More than 300 companies are presently utilising the lab's value-added analytical shared services, while over 600 services were provided to the industry in failure and material analysis in 2017. The presence of a comprehensive infrastructure of advanced analytical capabilities in Malaysia elevates the country's global competitiveness, reduces local dependency on foreign lab services, and lowers cost and turnaround time.

However, technological advancements have created the need for continuous enhancements to enable the lab to keep pace with Industry 4.0 practices. Competition from regional and global services is keen, requiring the lab to continuously innovate its systems, processes and offerings to better meet demands.

To alleviate these challenges, the lab is working to create mutually beneficial partnerships with global research institutes and companies such as Interuniversity Microelectronics Centre (IMEC) Belgium, Industrial Technology Research Institute (ITRI) Taiwan and Electronics and Telecommunications Research Institute (ETRI) Korea, while seeking and maintaining accreditation of its facilities with ISO/IEC 17025, ISO 9001 and other standards to secure global market acceptance. Also, given that most E&E companies are located in the Northern Corridor Economic Region (NCER), including Kedah's Kulim Hi-Tech Park (KHTP) and

Penang's Bayan Lepas Free Industrial Zone (FIZ), there is a need to locate some of the lab's services and research capabilities in the northern region to enable shorter turnaround times.

Developing integrated circuit design

In the field of permanent magnet synchronous motors (PMSM), MIMOS, in collaboration with local firms, My Technology and Emerald Systems released the Green Motion Controller (GMC), a new IC solution that efficiently controls and manages the performance of PMSM. The GMC will be used in selected applications and is expected to reduce energy consumption by 40% vis-à-vis existing solutions. GMC could potentially replace existing PMSM controllers, thereby simplifying system design and reducing product costs by up to 50%.

The GMC has proven effective in industrial elevator applications and MIMOS has successfully facilitated the development of an energy-saving prototype for large electrical home appliances, achieving energy savings of more than 40%. MIMOS is presently collaborating with a solution provider to develop a GMC-based platform for use in air conditioning compressor applications.

“The Green Motion Controller is expected to reduce energy consumption by 40%.”

Additionally, the GMC system has been demonstrated to original equipment manufacturers (OEMs) in China for potential adoption in their electrical home appliances solutions.

Growing the advanced packaging sector

Advanced packaging, a component in semiconductor manufacturing, has become extremely competitive in Malaysia with strong back-end manufacturing dominated by multinational companies (MNCs). The rapid changes in technology and demand for advanced packages are forcing manufacturers to introduce new differentiated packages to preserve their edge on their circuits' small sizes, low costs and high performance.



In 2017, RM1.2 billion was invested in this sector to undertake an expansion and diversification project to produce wafer-level chip scale packaging and wafer bumping, which are techniques of advanced packaging. The investment demonstrates Malaysia's position as a preferred investment destination for both new and existing companies against the backdrop of an uncertain economic climate, reaffirming domestic and foreign investors' confidence in Malaysia's economic fundamentals.

PROMOTING SUSTAINABLE ENERGY

Malaysia has introduced various incentives and strategies to encourage the growth of the renewable energy sector. Given Malaysia's location in the equatorial region where sunshine is in abundance all year round, solar energy is naturally positioned to play a crucial role in the country's future energy generation.

Demand for solar energy is expected to rise as consumers and businesses become increasingly aware of its benefits not just to the environment but also to the economy. Malaysia, a key exporter of solar photovoltaic (PV) cells and modules, is well-positioned to benefit from the spillover effects of growing solar power usage worldwide, which is expected to see growth of between 12%-20% over the next five years.

Ranked as the world's third largest producer of solar PV cells and modules with production capacity of 4.1 GW and 7.2 GW respectively,

Malaysia has 250 companies involved in upstream activities such as polysilicon, wafer, cell and module production, and downstream activities such as inverters and system integrators. In 2017, a RM300 million expansion project producing solar ingots, wafers, cells and modules was approved by MIDA. The project involves integrated manufacturing of solar PV products, from ingots to modules.

LED AND SSL CONTINUE TO ILLUMINATE

Malaysia is gaining prominence as a production hub for light-emitting diode (LED) manufacturers. The development and production of LED clusters in the country cover semiconductor devices for LED, wafer fabrication, as well as lighting products and solutions.

Creating local solid-state lighting champions

SME Corporation Malaysia's (SME Corp) capacity building programme to produce local solid-state lighting (SSL) champions aims to develop Malaysia's SSL value chain towards chip and application R&D. This programme assists local SSL companies in expanding abroad via trade delegations that focus on key SSL-related areas, establishes strong intellectual property (IP) recognition by the Government to thwart the entry of imitation LED products into Malaysia, and establishes pro-environment regulations and public awareness.



In one week, OSRAM's new LED chip factory in Kulim, Kedah can produce enough LEDs to replace all the street lights in New York, Rio de Janeiro, Hong Kong and Berlin.

The scope of SME Corp’s assistance encompasses matching grants for international certification costs and the acquisition of automated machineries and inspection tools. To date, it has provided RM7.6 million worth of matching grants to 11 companies: Avialite, Primelux Energy, ecoNoon, P-Plus, Extra-Built, LED Vision, PCO Lite, Oversea Lighting & Electric, HANS LEDLite, Novabrite and EcoTech LED. The companies recorded combined annual sales of RM137.6 million in 2017 against RM70.1 million in 2013 and combined annual exports worth RM8.4 million against RM6.3 million in 2014.

However, soft global economic conditions have caused some order cancellations and extension of project timelines. Some companies have also struggled to regain their cost competitiveness, while fluctuations in the foreign exchange rates have made certifications, imports of raw materials and packaging costlier, which compounded the competitive threat from China’s low-cost offerings.

To boost their export competitiveness, LED companies have joined the Go-Ex Programme, one of the High-Impact Programmes under the SME Masterplan 2012-2020, developed as part of the Government’s initiatives to guide and grow the exports of Malaysian small and medium enterprises (SMEs) by strengthening their resilience and competitiveness. Implemented by Malaysia External Trade Development Corporation (MATRADE), the programme is aimed at addressing challenges faced

by SMEs on new market entry due to the high upfront costs and the lack of detailed knowledge about new markets and competitors.

Expanding LED front-end operations

Meanwhile, OSRAM’s investment in Kulim, which will establish Malaysia’s first fully integrated LED epitaxy, wafer fabrication and product manufacturing facility, continues to progress well. The first stage of the facility, which employs 1,500 people, is now operational, whereas future expansion of two additional stages will bring in a total investment to RM4.9 billion.

Epitaxy

Epitaxy is a technique that involves growing a thin crystalline film of one material on top of another crystalline material, such that the crystal lattices match. In other words, epitaxy is when additional layers of semiconductor crystals are grown on the surface of the wafer.

The Northern Corridor Implementation Authority (NCIA) has facilitated OSRAM’s purchase of a metal organic chemical vapour deposition



The OSRAM factory in Kulim will produce blue LED chips which, by means of a converter layer, can generate white light.



(MOCVD) system and implementation of the Northern Corridor Competency Enhancement Programme (NCEP), as well as supported the Technical and Vocational Education and Training at Kulim Hi-Tech Park (TVET@KHTP) Programme, which is implemented by the KISMEC to produce skilled labour to support OSRAM's operations in Kulim.

ESTABLISHING MALAYSIA'S PROMINENCE IN TEST, MEASUREMENT AND AUTOMATION

Test and measurement form the basic block of automation by creating signals and capturing responses for control systems to perform decision making without human intervention. The impact of automation is tremendous – it increases productivity, quality and consistency of products and processes in mining, agriculture, manufacturing and services. In view of its cross-cutting linkages to various economic sectors, automation will serve as a catalyst to facilitate Malaysia's transition to a high-technology nation.

Building a test and measurement hub

A shared test and measurement hub was set up in Penang in 2014, led by Keysight Technologies and facilitated by NCIA, to develop local test and measurement companies as they seek to grow their research, development and commercialisation capabilities. The hub has raised the value of the local E&E ecosystem by developing their know-how in high-precision engineering. This has enabled Keysight to replace its foreign procurement of high-precision components with locally produced components, with some of its manufacturing plants in other parts of the world are now procuring from Malaysian vendors.

To date, seven local players have benefitted directly from this test and measurement hub. For example, CEEDTec and Myreka are currently Keysight's first-level vendors that have co-developed 26 local products with Keysight for the global market and created 36 IPs. Benefits from this initiative are significant, as the work packages of the first-

level vendors is further taken up by five more local players, namely STRiDE Electronics, Inari Amertron Berhad, Prodelcon, Tekun Asas and Bi Technologies.

To sustain competitiveness in the industry, there is a need for vendors to upscale their ability to design according to new product specifications. This will also require attracting, acquiring and retaining talent. In an effort to address this, the vendors are increasing their engagement with universities like USM through career talks and technical collaborations to ensure varsity studies reflect industry needs. The hub also provides the vendors' R&D teams with quick access to Keysight experts for consultation and verification.

Strengthening testing and certifications for solar and LED products

As for solar and LED products, testing centres have been created by QAV Technologies Sdn Bhd (QAV) to provide quality assurance and testing services. QAV is the only TUV NORD-certified failure analysis, reliability testing and electromagnetic compatibility centre in Malaysia. It is also the first American National Standards Institute (ANSI) certified lab outside of the United States (US). QAV has expanded its LED testing operations in Penang and set up a new operations branch in Selangor. QAV's operations in Malaysia benefit local manufacturers by generating income growth, as QAV's certifications enable direct shipments to the US. QAV's testing centres also assist local companies' development of testing and certification methods that are not available in the country yet.

In 2017, 52 products were tested by QAV, and currently aims to establish a platform for the certification of Malaysian product standards, thereby making Malaysia the Asia-Pacific regional hub for ANSI and the US Department of Energy (DOE) certification. This can benefit the country by attracting more LED MNCs to Malaysia. In addition, QAV maintains multiple industrial training and research collaborations with institutions of higher learning, such as Monash University, Universiti Tenaga Nasional (UNITEN), Multimedia University (MMU) and Universiti Tunku Abdul Rahman (UTAR).

However, QAV faces escalating testing costs and must contend with the unpredictable nature of standards and requirements. This encumbers QAV's efforts to train and retain its personnel, while

complicating its relationships with manufacturers, many of which do not actively keep abreast of changes in the landscape of standards and requirements. As such, QAV undertakes regular engagements with industry players to mitigate this.

Creating an innovation nucleus in test and measurement

The National Instruments Academy and Innovation Nucleus (NI-AIN) continues to empower innovation for local SMEs through its shared service lab facility. Launched on 13 September 2012 by National Instruments (NI), Technology Park Malaysia (TPM) and SME Corp, the centre currently houses approximately RM20 million worth of hardware and software assets. The automation solutions centre also serves as an SME incubator centre specialising in design, system integration, system customisation and engineering services, allowing SMEs to innovate without the need for huge capital outlays, while accelerating the lab-to-commercialisation phase. It also facilitates research institutions' R&D with minimal grants.

In 2017, the centre was involved in 10 projects by local companies, agencies and institutes encompassing test and measurement, system design, prototyping, proof-of-concept and system customisation, making a total of 74 projects since

2014. Notable projects undertaken this year include oil palm fruit grader by Universiti Putra Malaysia (UPM), lock rotor temperature monitor by Daikin Research & Development Malaysia Sdn Bhd, and payout tension meter system services and troubleshoot sensor by Asian Geos Sdn Bhd.

“The NI-AIN allows SMEs to innovate without the need for huge capital outlays.”

Going forward, there remains a need to increase the centre's utilisation. This can partly be resolved by convincing SMEs to embrace automation as part of the broader Industry 4.0 landscape through concerted efforts by Ministry of International Trade and Industry (MITI), MIDA and SME Corp. There is also the demand for more up-to-date equipment. As such, the centre will work with SME Corp to attract more SMEs, encourage higher-learning institutions to utilise its equipment and provide training for industrial Internet of Things (IoT) applications.

Enabling automation equipment manufacturing

The machinery and equipment (M&E) industry in Malaysia, which began with the need to repair



Collaboration between Keysight Technologies, Myreka and CEEDTec in the area of test and measurement resulted in the establishment of a Machinery and Equipment Shared Services Facility in Bayan Lepas, Penang.



and service imported machineries in the resource-based and agro-based industries, has undergone steep developmental phases. Rapid advancements in technology and innovation have propelled the industry to move up the value chain to manufacture state-of-the-art M&E for high-tech industries, such as the front-end semiconductor processing, medical devices, aerospace, and oil and gas.

In line with this, Malaysian companies have transformed from being mere contract manufacturers (CM) to undertake R&D, design and development (D&D), and system integration to become OEMs for the export market. In 2017, MIDA approved a diversification project with investment of RM181 million to produce chamber and module for semiconductor process equipment.

INDUSTRIAL E&E BOLSTERS GROWTH MOMENTUM

Industrial E&E projects under this NKEA focus on developing embedded systems and IoT products, electric vehicle component manufacturing, and nanotechnology and commercial graphene applications to compete in the world market and penetrate certain niche sectors. Leveraging on Malaysia's existing expertise and capabilities in the E&E sector, these new and high-growth segments will create more business opportunities.

Developing embedded systems and Internet of Things industry

Modern devices need to be increasingly intelligent to fulfil more sophisticated customer demands. The intelligence of these devices resides in embedded systems, which are intelligent solutions with tightly integrated hardware and software designed to perform a dedicated function. These intelligent embedded systems have evolved to become what is popularly called the IoT, a network of components that contain embedded technology to communicate via the internet. The data from IoT will provide insights to enable new revenue streams, better understand customer behaviour and improve control over operations, amongst others.

The Grow the Embedded Systems Industry project, helmed by Malaysia Digital Economy Corporation Sdn Bhd (MDEC), centred on growing the local industrial domain via industry collaborations with technology leaders such as Intel, NI, Altera, Cisco, Microsoft, Windriver and PTC-ThingWorx, and other parties including MIDA, MATRADE, NCIA, MIMOS, SIRIM, SME Corp, TalentCorp, Penang Skills Development Centre (PSDC) to develop local capabilities.

Two embedded systems and IoT projects were successfully completed in 2017: Silkron's retrofitted smart vending machine and Sophic Automation's IoT data extractor and universal bus translators for smart manufacturing. Overall, 23 projects have been approved and completed from 2012 till 2017. Moving forward, MDEC will continue to monitor and assist the growth of the embedded systems companies, accelerate digital adoption and unlock global market access. In addition, these companies are encouraged to focus on talent upskilling with data analytics capabilities to move up the development value chain and exploit new business models. Against this backdrop, opportunities for local embedded systems and IoT enterprises to tap into include niche-area technology development, application development, and technology collaborations and partnerships with technology MNCs.

In 2017, MIDA also approved a new project by an existing foreign company with a RM2.0 billion investment in R&D for the development of leading-edge semiconductor technologies for 10-nanometer complementary metal-oxide-semiconductor (CMOS) manufacturing processes, product innovation and IoT solutions. Through this investment, 100 patents are expected to be filed by local R&D talents, and 100 staff engineers will be hired over the next five years.

Strong policies is imperative to create high-impact projects and support adoption of embedded systems and IoT in vertical sectors and the development of the digital economy. Such policies should foster competition and cooperation between embedded systems and IoT industry players to provide the best solutions to end-users. Talent availability will also likely remain a hindrance, and thus policies should hence encourage talent development in science, technology, engineering and mathematics (STEM).

Enabling electric vehicle component manufacturing

Electric vehicles powered by lithium-ion batteries (LIBs) are fast gaining traction among car buyers due to their fuel savings. Electric vehicle component manufacturing in Malaysia commenced with the LIB manufacturing project, led by the Malaysia Automotive Institute (MAI), under the Economic and Technical Collaboration (ECOTECH) of the Malaysia-Australia Free Trade Agreement (MAFTA) in 2013. The first goal of this project was to acquire Malaysian IP in LIB manufacturing as a commercial platform for a Malaysian manufacturer. The target by 2020 is to have at least one local manufacturer producing LIBs for domestic and export markets. At present, battery material is produced on a pilot scale to support limited manufacturing of 18650-type LIBs. Performance and cycle tests have also been conducted on these LIBs.

“Spin-off benefits from the demand for electric buses will uplift the domestic manufacturing industry, especially in the E&E sector.”

Market development in Europe, Japan and China have presented unique opportunities for Malaysia. These countries have announced their intention to shift from conventional mobility options to green energy alternatives, including electric mobility. These announcements have been supported by several automakers which have pledged to go fully electric in the near future. Malaysia stands to gain from these developments due to its developing expertise in battery technology as well as its strategic location.

MAI also initiated the electric bus manufacturing project under ECOTECH in 2013. The first goal of this project was to acquire Malaysian IP in prototype-ready electric buses as a platform for a Malaysian commercial bus assembler. The target by 2020 is to have at least one local complete knocked-down (CKD) manufacturer producing electric buses for domestic and export markets with supporting infrastructure in place. A prototype electric bus has been delivered as a platform for commercial manufacturing development. Knowledge-transfer activities were undertaken that involved local engineers, while prospective investors were engaged and a business plan evaluation is in progress.

Demand for electric buses will likely pick up with the completion and implementation of more national development projects to improve public transport and mobility in urban areas. There is also international demand for proven technology for hot and humid climates like Malaysia's. Spin-off benefits to local vendors will uplift domestic manufacturing industry, especially in the E&E sector. At present, the nature of the investment, which is capital-intensive, continues to be the biggest obstacle to the advancement of this initiative. As such, more pilot projects should be in place to augment public awareness and market demand for this platform.

Transforming the E&E sector through nanotechnology

Nanotechnology plays an important role in Malaysia's Industry 4.0 journey as the global market for nano-materials and nanotech-based products is expected to reach US\$3 trillion by 2020. Hence, Malaysia is positioning local entrepreneurs and companies to capture a significant market share.

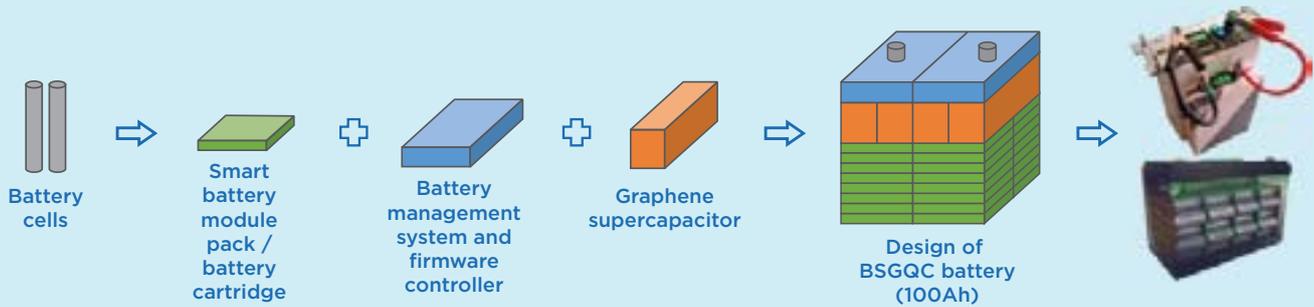
This initiative is supported by NanoMalaysia Berhad's nanotechnology commercialisation programmes, namely the National Graphene Action Plan 2020 (NGAP2020) and iNanovation. Both NGAP2020 and iNanovation help introduce companies to the adoption of commercial graphene and nanotechnology products for their E&E applications. NanoMalaysia also leads Advanced Materials Industrialisation, an open innovation platform under MITI designed to enhance E&E manufacturing in Malaysia.

Targets under this initiative for 2017 comprise of two product commercialisations utilising commercial graphene and nanotechnology for E&E applications. The first of these projects, the backup-storage graphene-based quantum cells (BSGQC) project, was conceived to support MNA Research, a specialist local start-up that received catalytic funding from NanoMalaysia's NGAP2020 to scale up its graphene-infused energy-storage management system from product development stage and penetrate the market. MNA Research has successfully completed pilot production and testing of the system and has acquired sales orders from various local companies specialising in renewable energy.



Backup-Storage Graphene-Based Quantum Cells (BSGQC)

BSGQC are potential replacement for valve-regulated lead-acid (VRLA) batteries due to their efficient energy-storage management system that can serve well in sustainable renewable energy generation, particularly for solar and telecommunication tower applications. BSGQC have the added advantage of withstanding extreme temperatures besides having environmentally friendly properties.

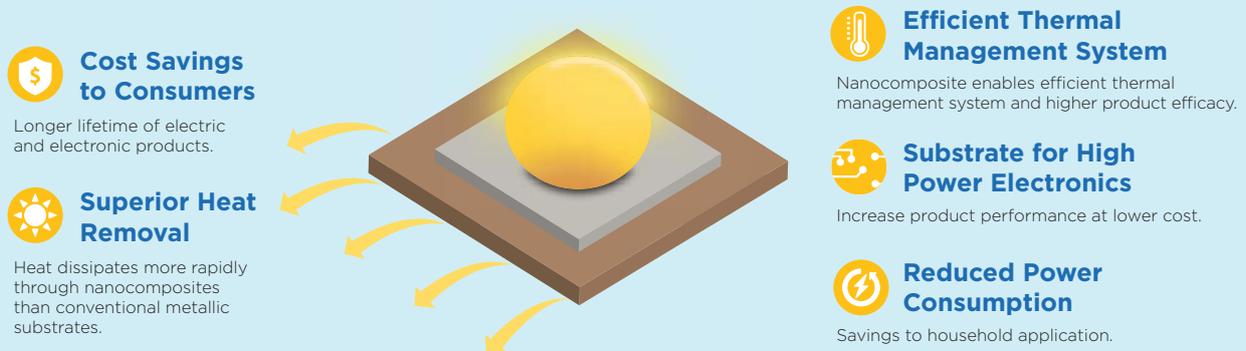


Structure of backup-storage graphene-based quantum cells (BSGQC).

The second project aims to complete the product development of LED heat sinks using copper-carbon nanotube (Cu-CNT) substrates and license the technology from Universiti Teknologi PETRONAS (UTP) to HANS LEDLite using catalytic funding provided under iNanovation, thus bringing the product to market. Pilot production has been completed and the technology licensing of the Cu-CNT substrates was signed in 2017 between UTP, NanoMalaysia and HANS LEDLite, enabling the first batch of substrates to be brought into the market.

Copper-Carbon Nanotube (Cu-CNT) Substrates

Cu-CNT-based LEDs possess higher thermal conductivity than aluminium-based LEDs, which are the current dominant variant in the market. This technology will help HANS LEDLite to differentiate themselves in the global LED market through higher performance, better reliability and longer lifespan products.



Benefits of copper-carbon nanotube (Cu-CNT) substrates.

The successful commercialisation of these two products pushes Malaysia's capabilities in energy storage for long-lasting high-performance LEDs in the market. However, both projects are hampered by limited capacity, administrative difficulties in securing projects and marketing. The companies must also further optimise performance and costs to ensure their products meet expectations while providing a reasonable and sustainable profit margin.

To mitigate these issues, NanoMalaysia provides a market validation platform to run proof-of-value assessments for these products in a real market situation. It also provides NANOVerify nanotech-based product certification programme to boost customer confidence. As these products are newly introduced to the market, continued partnership with NanoMalaysia will provide these companies access to future funding for new product development or the scaling up thereof, technical and business consultation services, IP rights consultation and services, and opportunities for wider market access.

DEVELOPING THE E&E TALENT POOL

Forging advanced competency in wafer fabrication

The MIMOS-NCIA Advanced Competency Development Centre (MIMOS-NCIA ACDC) is a human capital development centre serving the field of wafer fabrication and equipment. Jointly established by MIMOS and NCIA, it leverages on MIMOS' facilities and semiconductor training curriculum co-developed with SFAM to offer end-to-end, high-tech, industry-driven training to foster the hands-on experience needed to produce highly skilled workers for the E&E sector.

Since its launch in July 2017, 430 engineers and students have undergone skill enhancement at the centre. MIMOS has also trained more than 2,400 skilled workers in the E&E sector in the last decade with its provision of high-impact training to members of the SFAM, MNCs, SMEs, research institutions, lecturers and university students.

Unlike traditional training centres that focus on theory and provide limited hands-on exposure, the MIMOS-NCIA ACDC offers enhanced facilities for experiential learning in high-technology equipment maintenance and processes. In fact, 80% of the facility's training in industrial-grade wafer fabrication comprises of practical learning and the remaining 20% focuses on the theoretical frameworks, enabling accelerated development of skill sets that supports movement up the E&E value chain, and complements technical and vocational education and training (TVET) and Malaysia Board of Technologists (MBOT) programmes.

“ 430 engineers and students have undergone skill enhancement at the MIMOS-NCIA ACDC. ”

However, continual upgrade of the centre is required to keep pace with global technological advancements, including alignment with Industry 4.0 practices. As such, more strategic engagements could be done with the Ministry of Higher Education (MOHE) to make this centre an integral part of microelectronics and semiconductor education, thereby accelerating students' interest and development in the required fields to support industry needs.

Building capacity in test, measurement and automation

The NI-AIN Capacity Building Programme serves as a training hub for engineers and university students to obtain and upgrade their proficiency in the LabVIEW system design platform. The programme also offers guidance for engineers to complete their automation projects, training for participants in advanced data transfer method with data loss prevention technology, and training for trainers to advance their knowledge in the field of test and measurement as well as automation. As a result, engineers can produce better solutions and apply new industry technology such as IoT, automation and system integration. In 2017, the programme has upskilled 130 local talents.



TRANSFORMATIVE ENABLERS

Supporting collaborative research and development

Collaborative Research in Engineering, Science & Technology (CREST) is an industry-led catalyst for the growth of Malaysia's E&E sector by promoting industry, academia and government collaboration in R&D, talent development and commercialisation, targeting six focus clusters as defined by industry stakeholders, namely:

1. Optoelectronics, LED and SSL;
2. Embedded systems and IoT;
3. IC design, test and validation;
4. Advanced materials and packaging;
5. World-class electronic manufacturing;
6. Drones, driverless and autonomous vehicles.

Since CREST commenced operations in June 2012, a total of 46 local companies, 17 MNCs and 20 public and private universities have undertaken

118 collaborative R&D projects, amounting to a total project value of RM125.0 million, with industry contributing 61% to this total. Of the 118 projects approved, 41 have been completed since its inception the end of 2014, of which 10 have been translated into new products and processes that generate new revenues and savings from productivity in design and manufacturing processes.

The revenue and savings to be gained in five years from these new products and productivity tools are estimated at RM60.2 million – a remarkable return, given CREST's funding of just RM9.1 million for these projects. These R&D collaborations also enabled 57 students to complete their postgraduate studies, and 13 IP disclosures with seven patents to be filed.

Two new business spillover opportunities were also created from the projects. USM School of Physics' Thermal Materials Research Lab, led by Dr. Mutharasu Devarajan, partners with local SMEs in developing thermal interface engineering design solutions for LED and semiconductor component manufacturers. Also, USM School of Mechanical Engineering's 'TheVibrationLab', led by Professor Mohd Zaidi Ripin, provides acoustic and vibrational



The official launch of MIMOS-NCIA Advanced Competency Development Centre on 18 July 2017 was graced by Ahmad Rizan Ibrahim, Datuk Wira Dr. Abu Bakar Mohamad Diah and Datuk Redza Rafiq Abdul Razak.

The Development of the E&E Industry in Malaysia

The electrical and electronics (E&E) industry has become a major part of Malaysia's manufacturing sector and is a significant supporter of the country's export and employment levels. Due to its multiplier effects and extensive linkages with other sub-sectors, the industry has been identified as a catalytic subsector under the 11th Malaysia Plan to re-energise the nation's domestic manufacturing sector.

In this regard, the Malaysian Investment Development Authority (MIDA) is working to promote the growth of the semiconductor, solar, light-emitting diode (LED), test and measurement, as well as the automation industries. This effort is also being undertaken extensively on a more regional scale in the Northern Corridor Economic Region (NCER), led by the Northern Corridor Implementation Authority (NCIA).

Collaborations are key

Dato' Azman Mahmud, Chief Executive Officer of MIDA, states that collaborations between the public sector, industry and academia are crucial to address the industry's talent demands whilst increasing the competitiveness of existing workers. "MIDA has undertaken partnerships with various

stakeholders such as the American Malaysian Chamber of Commerce (AMCHAM), USAINS – the corporate arm of Universiti Sains Malaysia (USM), Talent Corporation Malaysia Berhad (TalentCorp), the Ministry of Higher Education (MOHE), and the Semiconductor Fabrication Association of Malaysia (SFAM)," Azman elaborated.

Notably, the Industry-Academia Collaboration (IAC), which was launched in 2015, has seen strategic collaborations formed between higher-learning institutions such as USM, Universiti Malaya (UM) and Universiti Teknologi Malaysia (UTM) with companies such as Intel, First Solar, National Instruments, Motorola and OSRAM. MIDA is also engaging with the Ministry of Finance (MOF), Ministry of Science, Technology and Innovation (MOSTI), MIMOS Berhad and related companies for the establishment of the Manufacturing Innovation Centre (MIC). MIDA is also cooperating with the Malaysia Digital Economy Corporation (MDEC) and Electrical and Electronics Strategic Council (EESC) to develop the Digital Internet of Things (IoT) Marketplace, an initiative led by Silterra. Meanwhile, the agency has also aligned efforts in the export chapter through the National Exports Council (NEC) and productivity chapter through the E&E Productivity Nexus (EPPN).

Datuk Redza Rafiq Abdul Razak, Chief Executive Officer of NCIA concurred with MIDA's stance on collaborations, saying that NCIA upholds



Datuk Redza Rafiq Abdul Razak, Chief Executive Officer of Northern Corridor Implementation Authority.



Dato' Azman Mahmud, Chief Executive Officer of Malaysian Investment Development Authority.



the “quadruple-helix model” that involves the government, private sector players, academia and the community in all of its development initiatives. “We leverage on private sector participation in line with the Government’s stand to position them as the driver of economic growth, with the government playing the role of enabler and facilitator,” said Redza, adding that engagements with members of the community and academia are crucial to secure their support and insights in order to refine the delivery of NCIA’s development initiatives.

Results from collaborations positive so far

“Our collaborations with the NEC and EEPN have resulted in incentives for Industry 4.0 and smart manufacturing, as announced in Budget 2018, including an Accelerated Capital Allowance of 200% on the first RM10 million qualifying capital expenditure incurred in the years of assessment 2018 to 2020 for manufacturing and manufacturing-related services sectors,” Azman said.

“The Capital Allowance, meanwhile, is for the purchase of ICT equipment and software with effect from year of assessment 2017, and expenditure incurred on the development of customised software with effect from year of assessment 2018. There is also the extension of the Automation Accelerated Capital Allowance, which was introduced in 2015 to year of assessment 2020 for labour-intensive industries such as rubber, plastic, wood and textiles,” he continued.

NCIA’s accomplishments are similarly illustrious. It has, amongst others:

1. supported a wafer chip producer’s capacity expansion initiative, which also benefited SMEs providing ancillary services such as parts cleaning, supply and installation of equipment;
2. set up a semiconductor equipment training centre with MIMOS;
3. established a waste treatment processing facility to support industries in Kulim Hi-Tech Park (KHTP);
4. developed assembly and test systems using advanced packaging technology;
5. supported the growth of substrate manufacturers and related industries;

6. facilitated the creation of a RM30.5 million LED test and certification centre by QAV;
7. collaborated with Keysight Technologies to build a test and measurement hub; and
8. collaborated with TF-AMD Microelectronics to grow automation equipment manufacturing with 12 local vendors.

These have culminated in OSRAM recently decided to set up a RM4.9 billion facility in KHTP.

However, the abovementioned achievements did not come easy. “Financial constraints prevented us from giving out more incentives to companies to implement Industry 4.0 and smart manufacturing initiatives,” explained Azman. This made it difficult to raise the low rate of innovation in the country and sustain the right talent pool to support the E&E industry.

Collaboration is, once again, key in addressing these challenges. To overcome funding constraints, MIDA is also doubling its efforts to connect local companies to multinational companies (MNCs) to achieve integration into their supply chains through adopting and producing new technologies, processes and products. To expand the talent pipeline, MIDA is engaging with policymakers, academia, and other stakeholders through initiatives such as career fairs and the Industry Working Group, which serves to strengthen and develop syllabi specific to emerging industry requirements.

Up north, Redza pointed to the establishment of the Kedah Science and Technology Park (KSTP) to help disseminate knowledge and information on technological advancements and get more SMEs on board with Industry 4.0. KSTP would drive the region’s economy through applied R&D by providing a platform to develop ground-breaking technologies via its Global Research Centre and Modern Industrial Park.

Certainly, the outlook for the industry looks bright, especially with MIDA and NCIA continuing to work closely with the relevant stakeholders to promote productivity and innovation whilst familiarising local companies with emerging technological trends.

Advancing Technology Through Building a Test and Measurement Hub

Test and measurement is essential to the electrical and electronics (E&E) industry as its technologies in smart sensors, precision engineering, intelligent instruments, data acquisition and signal processing are the foundation for automation; which is the crucial enabler to achieve technological advancement in Industry 4.0 and smart manufacturing.

Hence, under the NKEA E&E, building a test and measurement hub was pinnacle to the sectors' progress. Two companies participated in realising this requirement, namely; Keysight Technologies (Keysight), which is a leading electronic test and measurement company and National Instruments (NI), a provider of platform-based systems which enables engineers and scientists to solve complex engineering problems.

In collaboration with the Northern Corridor Implementation Authority (NCIA), Keysight launched a programme with two Malaysian design partners, CEEDTec and Myreka. The programme was designed to expand their research & development (R&D) and original design manufacturers (ODM)

capabilities to be able to design and build their own products. Two shared services facilities labs were established within Keysight to incubate CEEDTec and Myreka's design and development expertise in the areas of precision power source solutions and audio signal analysis solutions respectively.

On the other hand, NI had partnered up with Technology Park Malaysia (TPM) and SME Corporation Malaysia (SME Corp) to launch one of NI's largest public-private partnership initiatives in 2013, called the National Instruments Academy and Innovation Nucleus (NI-AIN). NI-AIN is a shared services lab facility, which comprises foundation labs for training, as well as vertical application labs for creating test, measurement and control systems for various industry applications. It is designed to be an small and medium enterprises (SME) incubator centre for high-value design and engineering services.

"Working alongside Keysight, CEEDTec and Myreka now have full scale design-to-manufacturing capabilities, benefitting from the technology



Chandran Nair, Vice President, Sales and Marketing for Asia-Pacific, National Instruments.



Chan Keng Cheong, Keysight's Vice President of Global Procurement and Materials.



collaborations, proximity to Keysight's global standards and access to market information. This has subsequently allowed them to compete on an international scale and move up the value chain," said Tay Eng Su, Keysight's Director of Customer Experience, Quality and Compliance.

Hing Wai Toong, NI Area Sales Manager, states that the NI-AIN provides a shared technology infrastructure that SMEs have access to for system development and integrations. "Our human capital development centre also provides training, certification and skills development programmes in science, technology and innovation. These complement our SME incubator center which hosts local and overseas experts who provide technical consultation in engineering projects, especially in test, measurement and control," explained Hing.

"Through participation in this programme with Keysight, CEEDTec has developed advanced capabilities on sophisticated measurement grade equipment design and manufacturing to enable them to become a full original equipment manufacturer company in the coming years with a brand and channel of their own. Meanwhile, Myreka has accumulated 15 intellectual properties and grown its technological capabilities to extend its design solutions to other multinational corporations," said Chan Keng Cheong, Keysight's Vice President of Global Procurement and Materials.

The rapid expansion of CEEDTec and Myreka has also spawned a second tier of local ecosystem partners who are providing advanced technology support in the areas of printed circuit board assembly, precision metal works and tooling and high-density transformers. All in all, this initiative has successfully grown seven local SMEs and created over 200 jobs.

Additionally, NI's Hing identified the low awareness of NI-AIN's benefits as a challenge to be overcome. "NI has always been committed to supporting the SME ecosystem. As such, encouraging SMEs to access the facility will be an ongoing commitment," says Hing. To do this, NI has been working closely with government agencies to roll out promotional and engagement programmes targeted at SMEs.

Keysight's initiative, in collaboration with NCIA, has been a catalyst for CEEDTec and Myreka to develop new and differentiated technologies through R&D, as well as showcase world-class innovations from Malaysia. Moving forward, Keysight's strategy with both CEEDTec and Myreka will continue to provide guidance in new technologies and markets to address future challenges and meet the complex demands of the ever-increasingly competitive business environment.

Chandran Nair, Vice President for Asia-Pacific of NI, says that the Malaysian Government is instrumental in encouraging local companies to invest in technology to streamline their work processes. "This encourages the use of automated test and measurement systems to meet productivity goals and test requirements for complex high-technology devices," Nair said. "By collaborating with NI, the Government has fulfilled the industry's needs in R&D and collaboration, and also continues to help upskill the current E&E workforce and facilitate the creation of new talent through skills-based learning for university students and fresh graduates."

The test and measurement segment will see tremendous growth going forward. Technological advancements, such as Industrial Internet of Things (IIoT), autonomous vehicles and 5G wireless systems, will result in overwhelming demand for next-generation test and measurement systems. Companies in this field will continue to be at the forefront, facilitating technological advancements and helping bring cutting-edge products to market quicker and at lower cost.

Creating Local Solid-state Lighting Champions

Solid-state lighting (SSL) products like light-emitting diodes (LEDs) have been receiving considerable attention due to the advantages they offer over conventional lighting technologies, such as their extended lifespans and reduced energy consumption.

To push Malaysia to the forefront of the production of these advanced lighting solutions, SME Corporation Malaysia (SME Corp) has been tasked to oversee 10 companies in the Malaysian LED Consortium (MLC) through its capacity-building programme, which will assist them in the areas of certification and regulation support, developing a technology roadmap, supply chain management, marketing strategy implementation, branding, and partner search. The programme moved into its second phase in 2014, supporting the MLC in achieving sales of RM84.2 million for the year.

Datuk Dr. Hafsah Hashim, Chief Executive Officer of SME Corp describes the programme as one of “total immersion”, where the corporation is wholly involved with the participating small and medium enterprises (SMEs) from end-to-end of the value creation chain. “SME Corp offers two forms of assistance: the first comes in the form of funding for the development or improvement of commercially viable SSL products, whilst the second takes the form of matching grants for the purchase or improvement of manufacturing equipment, testing, processes or monitoring techniques, to obtain international certifications,” she elaborated.

Two such companies are beneficiaries of this programme, i.e. Avialite Sdn Bhd and Primelux Energy Sdn Bhd. Avialite supplies aviation obstruction warning lights to warn aircraft of tall obstacle hazards in low-visibility conditions, while Primelux Energy supplies outdoor lighting and lux, as well as 3D photometric design.

Programme taking industry to greater heights

Since the programme’s inception, Hafsah observed that the consortium members’ research and



Primelux Energy Sdn Bhd.

development efforts have gained traction. “With our funding assistance, these companies are better able to research and develop innovative products to meet global market demands,” she said. “A number of them have made a name for themselves in countries like India, Australia, Vietnam, Indonesia and Thailand, with their products used in stadiums, public transportation systems and exhibition halls.”

Indeed, Hee Wee Leng, Co-Founder and Chief Executive Officer of Avialite reported that the company has been receiving orders from telecommunications companies in Indonesia, the Philippines and Myanmar for maintenance and new tower project requirements. “This supplements our domestic order book, which comprises such projects as the supply and installation of lamps nationwide for edotco Group Sdn Bhd worth RM8 million for five years, and a three-year nationwide contract from Telekom Malaysia Berhad worth RM16 million,” Hee said. Avialite’s quality offerings also garnered it awards such as the SME Corp Best Innovation Award in Manufacturing (2014), the Best Innovation Award from The Electrical & Electronics Association of Malaysia (2016), and the Enterprise 50 Award from SME Corp and Deloitte (2017).

Similarly, Aimi Syairah Md Zin, Deputy General Manager of Primelux Energy remarked that the company’s enhanced capacity enables it to work with international institutions like LUX-TSI, from which it receives world-class consultancy, testing and certification services as it undertakes design and manufacturing work for LED street lanterns. “We also engage with Oxford University Innovation



to procure research and training assistance for our business strategy development,” Aimi shared, adding that the company is primed to receive the prestigious CE marking that indicates conformity with health, safety, and environmental protection standards for products sold within the European Economic Area.

With the push for innovation also comes improved remuneration: skilled workers are able to draw over RM3,000 per month, whilst management-level employees can command in excess of RM5,000, Hafsa explained. Worker productivity levels and job opportunities have increased too, alongside sales in domestic and overseas markets.

These positive outcomes notwithstanding, Hafsa believes that several areas for improvement exist. “As our SMEs increasingly establish their footprint overseas, I would like to see more MNCs collaborating with them to give them greater impetus to be progressive in their outlook and world-class in their systems and processes.”

In addition, SMEs need to align themselves to Industry 4.0 and scale up their adoption of the latest technological advances to better compete in the global marketplace. She also believes that while our local SMEs are creative and keen to undertake new LED designs, they should protect their intellectual property (IP) via IP registrations and obtain international certifications for their products to attain a premium advantage.

Outlook is bright

Hafsa sees plenty of potential in SSL solutions overseas, as Europe has banned all fluorescent lighting, with Australia following suit. Hee added that LED lighting is gaining acceptance in Malaysia, making this a sunrise industry. “LED is the future of lighting. Its performance in terms of light output per unit of energy and lifespan will only get better,” Hee opined.



Avialite Sdn Bhd.

engineering design services to electronic product manufacturers and test validation equipment developers.

These projects yield many benefits to the local E&E field, including supporting SMEs in developing new technologies, nurturing start-ups in bringing innovative products to market, improving design and manufacturing cycle times to increase productivity, developing relevant postgraduate talents and technopreneurs, as well as enhancing the ability of local universities to support the industry in research, engineering and design activities.

“ 24 eco-design applications were undertaken at EIDC’s shared facilities in 2017. ”

However, more local companies, both SMEs and large local enterprises (LLEs), need to collaborate in commercialising research outputs to market. There is also a lack of self-funding and venture funding in developing technologies and solutions that are new to market. Thus, pre-seed and seed co-funding schemes should be created to support the validation of new technologies to market. Government funding agencies should also reallocate funds to the commercialisation of new technologies until the minimum viable product (MVP) stage to lower technological risk.

Promoting eco-industrial engineering design

Complementing the work of CREST is the SIRIM Eco-Industrial Design Centre (EIDC), which was set up to assist SMEs to move up the value chain by providing affordable services in product conceptualisation and visualisation, 3D design and modelling, environmental and engineering analysis, as well as rapid prototyping. EIDC creates the required excellence in the field of industrial design that combines eco-innovation elements to minimise environmental impact while ensuring aesthetics, ergonomics and usability of products. The facilities at EIDC has also been strengthened to comply with the Restriction of Hazardous Substances (RoHS) Directive.

In 2017, the number of eco-design applications undertaken by companies utilising EIDC’s shared facilities stood at 24, bringing the total number to 68 since 2015. Other benefits brought about by the centre include greater localisation of components, market expansion for businesses, reduction of processing time, waste and cost, as well as environmental sustainability.

However, EIDC is faced with aging facilities, high annual hardware and software maintenance expenditure, and low uptake of the facilities and eco-industrial design services. SMEs also possess limited knowledge and tools for product design, development and testing. Thus, they instead focus on low-level product development and R&D. The centre is also highly dependent on imported materials for 3D printing, while the low readiness of SMEs to adopt Industry 4.0 presents an overall hindrance to continuous growth.

In mitigating the challenges above, SIRIM is establishing the Additive Manufacturing Demonstration Centre (AMDC) at EIDC to sensitise SMEs in developing and producing more value-added products. EIDC will continue to focus on its targeted sectors, especially E&E, M&E, medical devices and aerospace, in the area of additive manufacturing technology advancement. In addition, the centre aims to create a conducive manufacturing system that will facilitate the uptake of additive manufacturing technology among SMEs in supporting the Industry 4.0 implementation in Malaysia.



Ir. Dr. Mohamad Jamil Sulaiman, Datuk Seri Panglima Wilfred Madius Tangau and Professor Ir. Dr. Ahmad Fadzil Mohamad Hani visited SIRIM Industrial Design Centre, Bukit Jalil, Kuala Lumpur.



MOVING FORWARD ▶▶

The Government will continue driving the development of the E&E sector by allocating targeted incentives and funding to promote the adoption of Industry 4.0, in line with its commitment to reduce Malaysia’s dependency on low-skilled foreign workers in the manufacturing sector. The adoption of Industry 4.0 in this context will increase efficiency and productivity, in tandem with global trends.

	Autonomous Robots	Autonomous, flexible and cooperative robots interact with one another and work safely side by side with humans and learn from them
	Simulation	Mirror physical world in a virtual model, which can simulate machines, products and humans, and allow for testing and optimisation of machine settings before the physical changeover
	System Integration	Universal data integration of companies, departments and functions to establish cohesive capabilities and enable truly automated value chains
	Industrial Internet of Things	Devices enriched with embedded computing and connected using standard technologies allow field services to communicate and interact with one another and centralised controllers
	Cyber Security	The need to protect critical industrial systems and manufacturing lines, which have increased connectivity and use of standard communications protocols, from cyber security threats
	Cloud Computing	Data sharing across sites and company boundaries to increase machine data and functionality and enable more data-driven services for production systems
	Additive Manufacturing	High performance and decentralised systems to produce of small batches of customised products that offer manufacturing advantages, such as complex and lightweight designs
	Augmented and Virtual Reality	Provide real-time information to improve decision making and work procedures, train plant personnel to handle emergencies, interact with machines and maintenance instructions
	Big Data Analytics	Collection and comprehensive evaluation of data from different sources to support real-time decision making

Nine advances in technologies which form the foundation of Industry 4.0.

Industry 4.0’s impact is manifold – it will transform the design process, manufacturing process, operation, service of products and production system, whilst the increased connectivity and interaction among parts, machines and humans will speed up production system by as much as 30% and improve efficiency level by 25%, elevating mass customisation to new levels. This enables faster, more flexible and efficient processes to produce higher-quality goods at reduced costs.

The Government has formulated the National Industry 4.0 Blueprint, which is led by MITI in close collaboration with MOSTI, MOHE, Ministry of Human Resource (MOHR), Ministry of Finance (MOF), Ministry of Communications and Multimedia (KKMM) and the Economic Planning Unit (EPU), to spearhead the development of Industry 4.0 strategies focusing on manufacturing and manufacturing-related services, with input from stakeholders within and outside of the industry. The National Industry 4.0 Blueprint will be tabled to the Cabinet in the first quarter of 2018. MIDA is also expected to complete a study titled “Future of Manufacturing: Industry 3+2” in the first quarter of 2018, covering five catalytic and high-potential growth industries sub-sectors; namely E&E, M&E, chemicals, aerospace and medical device.

In the immediate term, the Government aims to promote investments from high-technology companies to undertake advanced R&D activities in Malaysia. Plans are also afoot to develop upskilling programmes to train Malaysian engineers to undertake R&D and IC design activities to fulfil the industry’s demand for R&D personnel. MNCs will be encouraged to groom start-ups through R&D collaborations, local outsourcing and commercialisation support, whilst collaborations are fostered between MNCs and local universities to conduct R&D activities, increase commercialisation rate and align academic syllabi with industry needs.